

**REMARKS**

Please reconsider the application in view of the above amendments and the following remarks. Applicant thanks the Examiner for carefully considering this application.

**Disposition of Application**

Applicant notes that originally filed claims 1-28 were cancelled and claim 29 was added in a preliminary amendment filed concurrently with the application on December 29, 2003. In the first Action ("first Action"), dated June 6, 2006, the Examiner inadvertently addressed claims 1-28. In the response filed September 6, 2006, Applicant requested reinstatement of claims 1-21 for further prosecution on the merits and cancelled claims 22-29. Subsequently, the Examiner issued a supplemental Action ("supplemental Action"), dated September 28, 2006, that supersedes the first Action. In the supplemental Action, the Examiner considers claim 29 as the only pending claim. The following amendments and remarks are made in view of both the first Action and the supplemental Action to expedite examination of the application.

Applicant thanks the Examiner for the courtesies extended in the telephonic interview of September 19, 2006. Applicant thanks the Examiner for calling to indicate that the supplemental Action was being mailed to correct errors in the first Action, as discussed above.

**Disposition of Claims and Claim Amendments**

Claims 29-50 are pending in this application. Claim 29 has been cancelled in this reply. New claims 30-50 have been added. Claims, 30, 34, 39, and 45 are independent. The remaining claims depend, directly or indirectly, from claims 30, 34, 39, and 45. No new matter

has been added by way of these amendments, as support may be found in, for example, originally filed claims 1-21.

### **Objections**

The drawings are objected to for failing to show every feature of the invention specified in the claims. In particular, the Examiner asserts that none of the drawings (Figs. 1-17) explicitly show the claimed elements or features relating to “simulating a first and second design,” “comparing results,” or “generating a third design,” based on “comparative results,” as recited in independent claim 29. Claim 29 has been cancelled in this reply. Thus, this objection is now moot.

With respect to newly added claims 30-50, Applicant submits that the specification and drawings (Figs. 1-17) clearly describe the claimed elements or features. In the Examiner’s first Action, the Examiner asserts that none of the drawings (Figs. 1-17) explicitly show the claimed elements or features relating to “determining the axial force” by “combining axial force acting on the cutting elements,” as recited in independent claims 1 and 10 or the “combining the volume of each crater,” recited in independent claims 5 and 16. Newly added claims 30-50 include, *inter alia*, these claimed elements or features of originally filed claims 1, 5, 10, and 16.

In both the first Action and the supplemental Action, the Examiner alleged that 37 C.F.R. § 1.83(a) (“Rule 1.83”) requires every feature specified in the claims must appear in the drawings. However, the Examiner takes Rule 1.83 out of context. Specifically, Rule 1.83 is based on 35 U.S.C. § 113 reciting in pertinent part, “[t]he applicant shall furnish a drawing where necessary for the understanding of the subject matter sought to be patented.” 35 U.S.C. §

113 (2005); 37 C.F.R. 181(a) (2006); MPEP 608.02. Thus, the Rule 1.83 requirement that every feature of the invention specified in the claims must appear in the drawings is only a requirement when a drawing is necessary for the understanding of the subject matter sought to be patented.

In the present case, additional drawings are not required for understanding of the subject matter. Applicant respectfully submits that the specification clearly describes the claimed elements or features relating to “determining the axial force” by “combining axial force acting on the cutting elements” or “combining the volume of each crater,” on, for example, page 20, in the paragraph starting on line 1 and the paragraph starting on line 14.

In view of 35 U.S.C. § 113, because one of ordinary skill in the art would be able to replicate the teachings of the present disclosure in the specifically claimed embodiments, no additional drawings are required to understand the claimed subject matter. As such, Applicant believes the drawings are in compliance with Rule 1.83.

### **Double Patenting**

Claim 29 stands rejected on the ground of non-statutory obviousness-type double patenting as being unpatentable over claims 1-9 of U.S. Patent No. 6,873,947. Further, claim 29 stands rejected on the ground of non-statutory obviousness-type double patenting as being unpatentable over claims 1-28 of U.S. Patent No. 6,785,641. Claim 29 has been cancelled in this reply. Accordingly, this rejection is now moot with respect to claim 29.

Newly added claims 30-50 are similar to originally filed claims 1-21 and include, *inter alia*, the claimed elements or features of originally filed claims 1-21. In the first Action, the Examiner rejected originally filed claims 1-28 on the ground of non-statutory obviousness-type double patenting as being unpatentable over claims 1-9 of U.S. Patent No. 6,873,947.

Further, originally filed claims 1-28 were rejected on the ground of non-statutory obviousness-type double patenting as being unpatentable over claims 1-28 of U.S. Patent No. 6,785,641.

In light of the first Action and pursuant to 37 C.F.R. §3.73(b), the undersigned encloses herewith a terminal disclaimer for added claims 30-50 with respect to the patents above. Accordingly, Applicants believe newly added claims 30-50 are patentable.

### **Rejections under 35 U.S.C. §101**

Claim 29 stands rejected under 35 U.S.C. §101 because the claimed invention is drawn to non-statutory subject matter. Claim 29 has been cancelled in this reply. Thus, the rejection with respect to claim 29 is now moot.

In the first Action, the Examiner rejected claims 1-4 and 10-15 under 35 U.S.C. §101 asserting the claimed invention is drawn to non-statutory subject matter. Newly added claims 30-33 and 39-44 include, *inter alia*, the claimed elements and features of originally filed claims 1-4 and 10-15. In addition to the claimed elements of originally filed independent claims 1 and 10, independent claims 30 and 39 also recite graphically displaying the axial force acting on the plurality of roller cones. Thus, Applicant believes independent claims 30 and 39, and dependent claims thereof, are patentable.

Claim 30 recites a method for determining an axial force acting on each one of a plurality of roller cones on a roller cone drill bit during drilling, the method including calculating, from a geometry of cutting elements on each of the roller cones and an earth formation being drilled by the drill bit, an axial force acting on each of the cutting elements, incrementally rotating the bit and recalculating the axial forces acting on each of the cutting elements, repeating the incrementally rotating and recalculating for a selected number of

incremental rotations, combining the axial force acting on the cutting elements on each one of the roller cones, and graphically displaying the axial force acting on each one of the plurality of roller cones.

Claim 39 recites a method for balancing axial forces acting on each one of a plurality of roller cones on a roller cone drill bit during drilling, the method including calculating, from a geometry of cutting elements on each of the roller cones and an earth formation being drilled by the drill bit, an axial force acting on each of the cutting elements, incrementally rotating the bit and recalculating the axial forces acting on each of the cutting elements, repeating the incrementally rotating and recalculating for a selected number of incremental rotations, combining the axial force acting on the cutting elements on each one of the roller cones; and adjusting at least one bit design parameter, repeating the calculating the axial force, incrementally rotating and combining the axial force, until a difference between the combined axial force on each one of the roller cones is less than a difference between the combined axial force determined prior to adjusting the at least one initial design parameter, and graphically displaying the axial force acting on the plurality of roller cones.

Applicant notes that a claimed invention as a whole must accomplish a practical application. That is, it must produce a “useful, concrete, and tangible result.” *State Street*, 149 F.3d at 1373, 47 USPQ2d at 1601-02. Independent claims 30 and 39 have been amended to clarify the present invention recited. In particular, claims 30 and 39, as amended, include a practical application with a useful, concrete, and tangible result, as each claim recites graphically displaying the axial force acting on the plurality of roller cones. Thus, the claimed invention is statutory. Dependent claims are statutory for at least the same reasons. Accordingly, newly added claims 30-33 and 39-44 are patentable.

**Rejections under 35 U.S.C. §102***Rejection under 35 U.S.C. §102(e)*

Claim 29 stands rejected under 35 U.S.C. §102(e) as being anticipated by U.S. Patent No. 6,213,225, issued to Chen (“Chen”). Claim 29 has been cancelled in this reply. Thus, this rejection is now moot.

In the first Action, the Examiner rejected claims 1-28 under 35 U.S.C. §102(e) as being anticipated by Chen. Newly added claims 30-50 include, *inter alia*, the claimed elements and features of originally filed claims 1-21. Applicant respectfully submits that the Declarations under 37 C.F.R. §1.131 and corresponding exhibits by Christopher Cawthorne and Sujian Huang filed January 15, 2004 and May 25, 2004 in the parent case, Application No. 09/635,116 (now Patent No. 6,873,947), establish the reduction to practice of the present invention prior to the earliest effective filing date of Chen, *i.e.*, August 31, 1998. Should the Examiner require an additional Declaration under 37 C.F.R. §1.131 be filed, the Applicant requests that the Examiner contact the undersigned at his earliest convenience. Chen has been antedated. Thus, Chen has been removed as a valid prior art reference. Accordingly, Applicant believes claims 30-50 are patentable.

*Rejection under 35 U.S.C. §102(b)*

Claim 29 stands rejected under 35 U.S.C. §102(b) as being anticipated by “The Operational Mechanics of The Rock Bit,” by Ma, *et al* (“Ma”). Claim 29 has been cancelled in this reply. Thus, this rejection with respect to claim 29 is now moot.

In the first Action, the Examiner rejected claims 22-28 under 35 U.S.C. §102(b) as being anticipated by Ma. Newly added claims 30-50 include, *inter alia*, the claimed elements

and features of only originally filed claims 1-21. Thus, Applicant believes claims 30-50 are patentable.

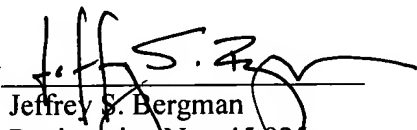
### Conclusion

Applicant believes this reply is fully responsive to all outstanding issues and places this application in condition for allowance. If this belief is incorrect, or other issues arise, the Examiner is encouraged to contact the undersigned or his associates at the telephone number listed below. Please apply any charges not covered, or any credits, to Deposit Account 50-0591 (Reference Number 05516/056003).

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Respectfully submitted,

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